

REMARKS

Claims 1, 5, 9 and 10 were rejected under 35 U.S.C. §103(a) as being unpatentable over Schwalm (U. S. Patent No. 4,445,945) in view of Krogh et al (U. S. Patent No. 2,241,555) . and Waka et al (U. S. Patent No. 6,187,111). Claims 1, 5, 9 and 10 have been amended. Claims 1, 5, 9 and 10 remain pending in the case.

The '555 invention discloses a thermal conductivity sensor in the heat treatment. However, the thermal conductivity sensor or measurements is a well-known gas chromatographic type analyzer, which was described in the present application as the conventional technology. Namely, the above type sensors have the following problems: (a) high cost; (b) cannot be used in vacuum measurement; and (c) cannot be used to analyze the atmosphere gas by feedback control.

Furthermore, in reference '555 the sensor does not directly analyze of all gas sampled, while performing adsorption and separation of the gas, and then measuring a specific gas concentration.

In the present invention, a thermal conductivity is measured by a Pirani vacuum gauge which can be used in a vacuum.

Moreover, a total atmosphere gas inside the carburizing chamber is directly measured by the thermal conductivity sensor, the relation between the total thermal conductivity of the gas and the surface area of an object to be treated or carbon potential is aimed at.

Accordingly, the entire surface area of an object to be treated can be detected and the carbon concentration in the atmosphere gas can be controlled and consequently, the carburizing quality of the object can be improved greatly.

Further, because the pressure during carburizing is kept at 13 to 1000 Pa, soot generation can be suppressed and an evenly deep carburizing layer can be formed in the surface of the object.

In summary, none of the cited prior art disclose or suggest the unique features of (1) under a pressure of 13 to 1,000 Pa and (2) measuring a thermal conductivity with a Pirani vacuum gauge at all, and therefore the cited prior art does not have the aforementioned advantages.

Application Serial No. 10/044,516
Date July 27, 2004
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Page 6 of 6

It is respectfully submitted that this Amendment traverses and overcomes all of the Examiner's objections and rejections to the application as originally filed. It is further submitted that this Amendment has antecedent basis in the application as originally filed, including the specification, claims and drawings, and that this Amendment does not add any new subject matter to the application. Reconsideration of the application as amended is requested. It is respectfully submitted that this Amendment places the application in suitable condition for allowance; notice of which is requested.

Respectfully submitted,

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